



Heat Flux Sensor

Public Safety

Shown below is a size comparison view of a new Heat Flux Microsensor developed by Vatel Corporation, Christiansburg, Virginia. It was developed under a Small Business Innovation Research contract as part of the NASA/Department of Defense National Aero-Space Plane (NASP) hypersonic research program.

The development was intended to meet a need for an advanced heat flux gage capable of operating durably and reliably in very high temperature, high heat flux environments in such applications as gas turbine blades, hypersonic combustion chambers, rocket nozzles and atmospheric reentry panels.

Vatell used the NASP technology as a departure point for development of a line of commercially available sensors that measure heat flux (the rate of heat energy flowing into and out of a surface) and at the same time provide readings on the temperature of the surface. The Heat Flux Microsensor is designed for heat transfer measurements under adverse environmental conditions or where exceptional ruggedness is a requirement.

Vatell's microsensors are fabricated with thin film layers of conducting and insulating material applied by a sputtering process; the total thickness of all layers is about two microns, so thin that the gages cause negligible flow disruption. They are available on ceramic or metal substrates, in standard or custom designs.

Major advantages, in addition to simultaneous measurement of both heat flux and surface temperature, include response to heat flux in less than 10 microseconds and the ability to withstand temperatures up to 1200 degrees Centigrade.

The Vatell microsensor has a wide range of potential applications in and beyond aerospace operations, including high speed aerodynamics, supersonic combustion, boiling heat transfer, flame dynamics, blade cooling, thermal property measurement, mass flow measurement and blood perfusion measurement.

